

40.430 GEOLOGIC HAZARD AREAS

40.430.010 INTRODUCTION

- A. Purpose. The purpose of this chapter is to safeguard public health, safety and welfare by placing limitations on development in geologically hazardous areas consistent with the requirements of the Growth Management Act and WAC 365-190-080.
- B. Applicability and exemptions.
1. Applicability. This chapter applies to all construction, development, earth movement, clearing, or other site disturbance which requires a permit, approval or authorization from the county in or within one hundred (100) feet of a geologic hazard area except for exempt activities listed in subsection (B)(2). Regulated geologic hazards include steep slope hazard areas, landslide hazard areas and seismic hazard areas.
 2. Exempt Activities and Uses. The following activities and uses are exempt from the provisions of this chapter:
 - a. Emergency activities which require immediate action to prevent an imminent threat to health, safety or property. As soon as practical, the responsible party shall provide written notification to the responsible official and obtain all applicable permits;
 - b. The expansion, remodel, reconstruction or replacement of any structures which will be set back from the geologic hazard area a distance which is greater than or equal to the setback of the original structure and which will not increase the building footprint by more than one thousand (1,000) square feet inside a steep slope hazard area, landslide hazard area or their buffers;
 - c. Any replacement, operation, repair, modification, installation or construction by a state or locally franchised utility company in an improved right-of-way or utility corridor;
 - d. Normal and routine maintenance and repair of existing utility facilities, equipment and appurtenances;
 - e. Any development activity on or within one hundred (100) feet of steep slopes that have been created through previous, legal grading activities is exempt from steep slope hazard regulations; and
 - f. All forest practices other than Class IV G (conversions).
 3. This chapter applies to Class IV G forest practices (conversions).
- C. Geologic hazard area maps and designation criteria.
1. Maps.
 - a. Adopted Maps. Maps signed by the board entitled:
 - (1) Severe Erosion Hazard Areas.
 - (2) Relative Earthquake Hazard Map – Vancouver Urban Area.
 - (3) Steep Slopes and Landslide Hazards; are adopted by reference and are on file with the County Auditor.
 - b. Identification. Geologic hazards are usually localized individual occurrences that may affect only small, separate areas. In addition, activities such as grading and clearing can create or increase slope instability where none was previously identified. Because of this, geologic hazard areas have not been identified on a site-specific basis.
 - c. Source data. The approximate location and extent of geologic hazard areas are shown on the geologic hazard area maps adopted herein. The county will adopt updated mapping as more detailed information becomes available. The maps are intended to meet the designation criteria listed in WAC 365-190-080 and are based on the best available information, including:
 - (1) Slope Areas Mapping for Clark County, Clark County Department of Assessment and GIS;
 - (2) Slope Stability of Clark County, Washington Department of Natural Resources, 1975 and landslides mapped in Geologic Map of the Vancouver Quadrangle, Washington and Oregon, Washington Department of Natural Resources, 1987; and

- (3) Relative Earthquake Hazard Map for the Vancouver, Washington Urban Region, Washington Department of Natural Resources, 1994.
 - d. Map updates. Results of binding pre-determinations and other site investigations required under this chapter and the building code will be compiled by the department and incorporated into future geologic hazard area map revisions. The county will adopt updated maps as more detailed information becomes available. The review of such new information shall include local geologists and engineers familiar with the requirements of this chapter and how it is applied to new development.
 - 2. Designation criteria. Along with geologic hazard area mapping, designation criteria are listed for steep slope hazard areas, landslide hazard areas and seismic hazard areas are listed below. Where the geologic hazard area maps and designation criteria conflict, the designation criteria shall prevail.
 - a. Steep slope hazard areas are areas where there is not a mapped or designated landslide hazard, but there are steep slopes equal to or greater than forty percent (40%) slope. Steep slopes which are less than ten (10) feet in vertical height and not part of a larger steep slope system, and steep slopes created through previous legal grading activity are not regulated steep slope hazard areas. The presence of steep slope suggests that slope stability problems are possible.
 - b. Landslide hazard areas are areas that, due to a combination of slope inclination, soil type and presence of water are susceptible to landsliding in accordance with the following criteria:
 - (1) Areas of previous slope failures including areas of unstable old or recent landslides;
 - (2) Areas with all three (3) of the following characteristics:
 - (a) Slopes steeper than fifteen percent (15%),
 - (b) Hillsides intersecting geologic contacts with permeable sediment overlying a low permeability sediment or bedrock, and
 - (c) Any springs or groundwater seepage;
 - (3) Slopes that are parallel or sub-parallel to planes of weakness, such as bedding planes, joint systems and fault planes in subsurface materials;
 - (4) Areas mapped by:
 - (a) Washington Department of Natural Resources Open File Report: Slope Stability of Clark County, as having potential instability, historical or active landslides, or as older landslide debris, and
 - (b) The Washington Department of Natural Resources Open File Report Geologic Map of the Vancouver Quadrangle, Washington and Oregon, as landslides;
 - (5) Slopes greater than eighty percent (80%), subject to rock fall during earthquake shaking;
 - (6) Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and stream undercutting the toe of a slope;
 - (7) Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows, debris torrents or catastrophic flooding;
 - (8) Areas within one hundred (100) feet of an open-pit mine sites subject to steep slope hazard or landslide hazard.
 - c. Seismic hazard areas are areas subject to severe risk of damage as a result of earthquake-induced soil liquefaction, ground shaking amplification, slope failure, settlement, or surface faulting. Relative seismic hazard is mapped on Plates 1 and 2 of the report Relative Earthquake Hazard Map of the Vancouver, Washington, Urban Area, published by the Washington Department of Natural Resources.
- D. Relationship to Chapter 40.570 environmental impacts. Geologic hazard area protective measures required by this section shall constitute adequate mitigation of significant adverse environmental impacts related to geologic hazards for purposes of Chapter 40.570.
- E. Reasonable use assurance. Nothing in this section shall preclude the issuance of a single-family building permit on a lawfully created lot.
- F. Density transfer. Land divisions regulated by this section may be eligible for density transfers under Section 40.220.010(C)(2).

- G. Open space tax incentives. Tax incentives may be available for owners of land set aside in landslide protection hazard areas through the open space taxation program.

40.430.020 STANDARDS

- A. General. The following requirements for development activities in geologic hazard areas list prohibited activities, buffer requirements, and setback requirements. The following section describes required buffers and setbacks, and general requirements for development activities in geologic hazard areas.—
1. Development on steep slope hazard areas is regulated to prevent potential landslide damage by placing improvements away from steep slopes and leaving steep slopes in natural vegetation.
 2. Development in landslide hazard areas is generally not allowed, and requires buffers that keep vegetation in a natural state on and around the landslide hazard area.
 3. Seismic hazards due to liquefaction, ground shaking amplification and landslides exist for large areas of the county. Only detailed site analysis can determine how soils and structures will respond at a particular site. Site investigation requirements of the Uniform Building Code are used to ensure that structures are built to minimum safety standards based on existing knowledge of earthquake hazard. Section 40.430.020(F) provides additional guidelines describing where site investigations should be required for seismic design.
 4. If an applicant wishes to perform development activities not allowed by Sections 40.430.020(D) and (E), a geologic hazard area study meeting the requirements of subsection (4) of Section 40.430.030(C) must be completed. The development proposal may be approved, approved with conditions, or denied based on the responsible official's evaluation of the suitability of the mitigation measures proposed by the geologic hazard area study to protect life, safety, and slope stability on abutting properties.
- B. Erosion requirements. All activities on hillsides subject to severe erosion hazard must minimize erosion by following management practices prescribed by the erosion control standards of Chapter 40.380.
- C. Stormwater requirements. For projects within one hundred (100) feet of steep slope hazard areas or landslide hazard areas, runoff shall not be infiltrated into the ground. Runoff should be directed through a water-tight pipe beyond the base of the slope or landslide area and discharged to a suitable drainage way. An energy dissipating device shall be placed at the discharge point.
- D. Steep slope hazard areas.
1. Except for mineral extraction practices, development activity on or within one hundred (100) feet of slopes steeper than forty percent (40%) that do not have a mapped or designated landslide hazard shall comply with the requirements of this section.
 2. Buffer and Setback Distances.
 - a. Activities at the base of ascending slopes (building at the bottom of a steep slope):
 - (1) For slopes greater than or equal to forty percent (40%) and less than one hundred percent (100%), buffers shall extend a distance away from the toe of the slope that is equal to the vertical height of the slope divided by two, but not to exceed fifteen (15) feet (Figure 40.430.020-1). For slopes less than one hundred percent (100%), the toe of the slope is defined as a distinct break in slope at the base of a steep slope.
 - (2) For slopes greater than one hundred percent (100%), the buffer shall extend a distance back from the toe of the slope equal to the height of the slope divided by two, not to exceed fifteen (15) feet. The buffer shall be measured horizontally from a plane, drawn tangent to the top of the slope at an angle of forty-five (45) degrees to the proposed structure (Figure 40.430.020-3).
 - (3) The setback shall be eight (8) feet beyond the buffer.
 - b. Activities at the tops of descending slopes (building at the top of a steep slope):
 - (1) For slopes greater than or equal to forty percent (40%) and less than one hundred percent (100%), buffers shall extend a distance back from the top of the slope equal to the vertical height of the slope divided by three, but not to exceed forty (40) feet. The top of

the slope is defined as a distinct break in slope at the top of a steep slope (Figure 40.430.020-1).

- (2) For slopes greater than one hundred percent (100%), the buffer shall extend a distance back from the top of the slope equal to the height of the slope divided by three, but not to exceed forty (40) feet. The buffer shall be measured horizontally from a plain drawn at forty-five (45) degrees (one hundred percent (100%) slope) from the toe of the slope to the proposed structure (Figure 40.430.020-2).
 - (3) The setback shall be eight (8) feet beyond the buffer.
 - c. For projects not required to have a landslide protection area under Section 40.430.030(B), the setback from the steep slope shall be equal to the buffer distance set in this subsection.
 3. The responsible official may approve buffers and setbacks which differ from those required by subsection (1) of this section if the applicant submits a geologic hazard area study described in Section 40.430.030(C), which technically demonstrates and illustrates that the alternative buffer provides protection which is greater than or equal to that provided by the buffer required in subsection (D)(1) of this section.
 4. The responsible official may increase buffers or setbacks where necessary to meet requirements of the Uniform Building Code.
 5. All portions of steep slope hazard areas and steep slope buffers on the site which are planned to be undisturbed by permitted development activities shall be designated as landslide protection areas in accordance with Section
 6. Other than for exemptions listed in Sections 40.430.010(B) and 40.430.030(B), vegetation removal is not allowed on slopes over forty percent (40%) without an approved geologic hazard area study described in Section 40.430.030(C).
 7. Buffers, landslide protection areas and setbacks for steep slopes on projects having approved grading shall be based on regulated steep slopes that remain after that grading.
- E. Landslide hazard areas.
 1. A development proposal on a site containing a landslide hazard area shall meet the following requirements:
 - a. A minimum buffer of fifty (50) feet shall be established from all edges of the landslide hazard area. The buffer shall be extended as required to mitigate a steep slope or erosion hazard or as otherwise necessary to protect the public health, safety and welfare; and
 - b. All portions of landslide hazard areas and buffers shall be designated as landslide protection areas in accordance with Section 40.430.030(B).
 2. Other than exempt activities, clearing or alteration of a landslide is allowed only if the following are met:
 - a. A development proposal does not decrease slope stability on contiguous properties;
 - b. Mitigation is based on best available engineering and geological practice and is described in an approved geologic hazard area study as specified in Section 40.430.030(C).
 3. Neither buffers nor a landslide protection area will be required if the activity meets the requirements of subsection (E)(2) of this section.
- F. Seismic hazard areas. Development activity in a seismic hazard area shall meet all applicable provisions of the Uniform Building Code, as adopted by the county. The department shall use the site specific seismic hazard investigation requirements based on relative earthquake hazard mapping described in Using Relative Earthquake Hazard Mapping for Land Use Planning and Building Permit Administration published by Metro, Portland, Oregon, May 1996, attached as Table 40.430.020.

Figures 40.430.020-1 through Figure40.430.020-3

Slope Setback Diagrams

Figure 40.430.020-1

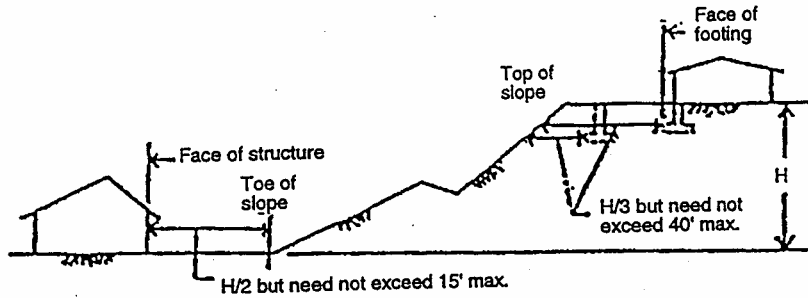


Figure 40.430.020-2

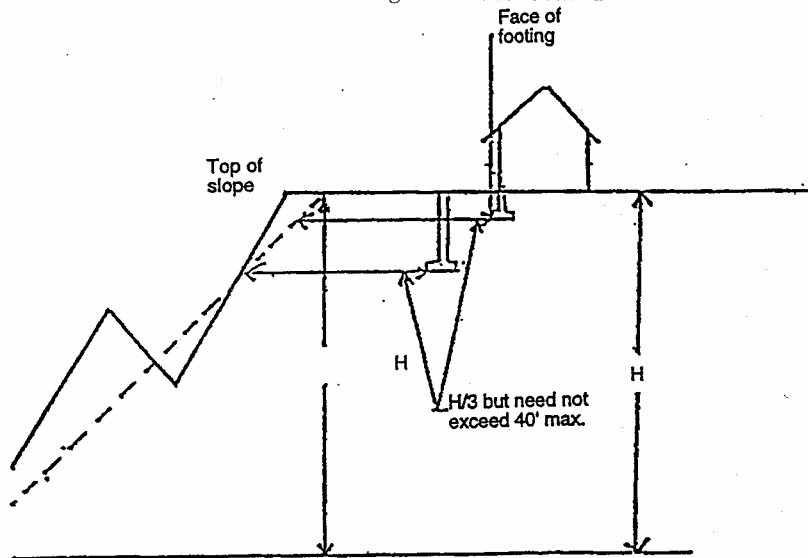


Figure 40.430.020-3

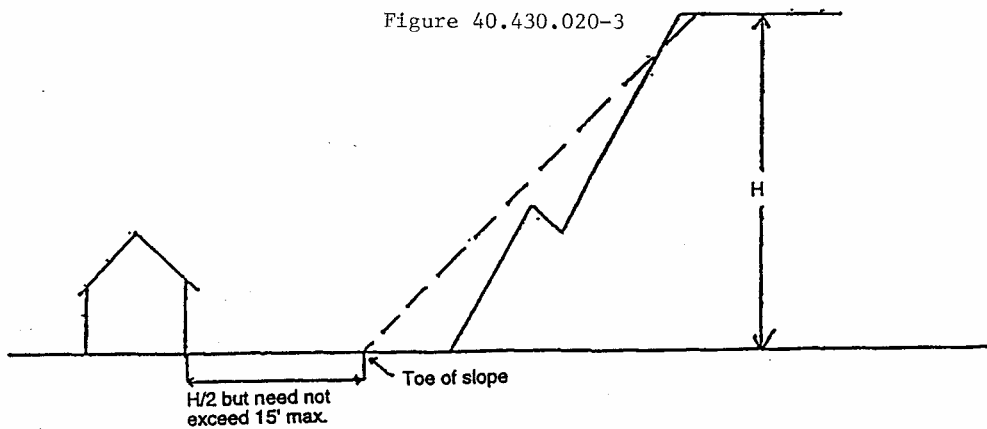


Table 40.430.020-1. Site Specific Seismic Hazard Investigation Requirements Based on a Relative Earthquake Hazard Map

- 4 = Site investigation with panel peer review required.
3 = Site investigation required unless data suggest otherwise.
2 = Site investigation not required unless data suggest otherwise.
1 = Site investigation not required.
(a) Discretion should be applied so that unnecessary site investigations are not required for smaller buildings within these categories. Guidelines to determine when investigations are needed should be established.
(b) Site investigation required if stipulated in a subdivision approval or other development approval of the planning agency. (Confirm definition.)

Land Use Group	Land Uses	Relative Earthquake Hazard Zone			
		A	B	C	D
Earthquake Performance Objective is Fully Functional (Acceptable risk is near zero)					
Potential Catastrophe if Damaged	Large dams	4	4	4	4
	Nuclear plants	4	4	4	4
	Facilities using/storing large quantities of hazardous materials	4	3	3	3
Earthquake Performance Objective is Immediate Occupancy (Acceptable risk is very low)					
High-Occupancy with Involuntary or Dependent Occupants	Day care centers <250 kids	3	3	2	1
	Day care centers >250 kids	3	3	2	1
	Schools K-12 <300 students	3	3	2	1
	Schools K-12 >300 students	3	3	2	1
High-Occupancy with Involuntary or Dependent Occupants	Convalescent homes <50 persons	3	3	2	1
	Convalescent homes >50 persons	3	3	2	1
	Jails and detention facilities	3	3	2	1
Essential for Emergency Response	Fire and police stations	3	3	3	2
	Garages for emergency vehicles	3	3	3	2
	Water tanks	3	3	3	2
	Structures housing fire suppressants	3	3	3	2
	Government communications centers	3	3	3	2
	Emergency response centers	3	3	3	2
	Hospitals	3	3	3	2
	Medical building with surgical services	3	3	3	2
Critical to the Functioning of Clark County	Large power plants	3	3	3	2
	Power interties	3	3	3	2
	Sewage treatment plants	3	3	3	2
	Water plants	3	3	3	2
	Regional highways and bridges and tunnels	3	3	3	2
	Regional rail lines	3	3	3	2
	Airports	3	3	3	2
	Port facilities	3	3	3	2
	Major communications facilities	3	3	3	2
	Telephone exchanges	3	3	3	2
	Radio and TV stations	3	3	3	2
Earthquake Performance Objective is Damage Control (Acceptable risk is very low)					
High Occupancy	Buildings >10 stories	3	3	2	1

Table 40.430.020-1. Site Specific Seismic Hazard Investigation Requirements Based on a Relative Earthquake Hazard Map

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2 = Site investigation not required unless data suggest otherwise.
1 = Site investigation not required.
(a) Discretion should be applied so that unnecessary site investigations are not required for smaller buildings within these categories. Guidelines to determine when investigations are needed should be established.
(b) Site investigation required if stipulated in a subdivision approval or other development approval of the planning agency. (Confirm definition.)

Land Use Group	Land Uses	Relative Earthquake Hazard Zone			
		A	B	C	D
	Public and private colleges <500 occupants	3	3	2	1
	Public and private colleges >500 occupants	3	3	2	1
	Public assembly places with >300 capacity	3	3	2	1
	Hotels/motels >50 rooms >60,000' >10 stories	3	3	2	1
	Major industries and employers	3	3	2	1
	Apartments >25 units	3	3	2	1
	Buildings with >150 employees	3	3	2	1
Important Local Impacts if Damaged	Facilities using/storing small quantities of hazardous materials	3	3	2	1
	Small dams that could cause flooding	3	3	2	1
	Gas stations	2	2	2	1
	Highways, streets, bridges	2	2	2	1
	Utility lines, substations, and gas mains	3	3	2	1
	Water and sewer mains	3	3	2	1
	Industries/business important to economy	2	2	2	1
	Health care clinics	2	2	2	1
	Co-generation power plants	3	3	2	1
Earthquake Performance Objective is Substantial Life Safety (Acceptable risk is moderate)					
Moderate Occupancy	Buildings with 4 to 10 stories	3	3	2	1
	Multi-family buildings with 9 to 25 units (b)	3	3	2	1
	Buildings with 50 to 150 employees	3	3	2	1
Moderate Occupancy	Buildings with 50 to 150 employees >60,000' >10 stories	3	3	2	1
	Public assembly places: 50 to 300 capacity	3	3	2	1
	Hotels/motels <50 rooms <60,000' <10 stories	3	3	2	1
Low Occupancy	Multi-family buildings with 2 to 8 units (a)	2	2	1	1
	Buildings with <50 employees (a)	2	2	1	1
	Buildings with 1 to 3 stories (a)	2	2	1	1
	Public assembly places with <50 capacity (a)	2	2	1	1
	Single-family houses (b)	2	2	1	1
	Manufactured dwelling (b)	2	2	1	1

40.430.030 ADMINISTRATION

- A. Binding pre-determination. Prior to submittal of a triggering application, a person may request from the responsible official, through a Type II application process described in Section 40.510.020, a written binding pre-determination of whether a probable regulated geologic hazard area exists on or within 100 feet of any parcel less than forty (40) acres. The pre-determination shall be binding on the responsible official for a period of three (3) years; provided, that such pre-determination shall be subject to administrative appeal upon its application in conjunction with a triggering application. The fee for a pre-determination is set forth in Chapter 6.130. A complete predetermination shall include a list of the submittal requirements for a site description under Section 40.430.030(C)(3). Additional submittal requirements may later be required as a part of a geologic hazard area study under Section 40.430.030(C)(4) if the proposal intends to develop within a steep slope or landslide hazard area, or their buffers.
- B. Establishment of landslide protection areas.
 - 1. Steep slope hazard areas and landslide hazard areas and buffers for which permanent protection is required pursuant to Sections 40.430.020(D) and (E) shall be designated landslide protection areas.
 - 2. Landslide protection area requirements apply only to site plans and land divisions.
 - 3. For all development activities subject to this section, landslide protection areas shall be delineated on binding site plans and plots which shall be recorded with the County Auditor.
 - 4. A conservation covenant applicable to the designated landslide protection area shall be recorded in a form approved by the Prosecuting Attorney as adequate to incorporate the restrictions of this chapter.
 - 5. Prior to any site development activity, the applicant shall mark with temporary markers in the field the boundary of all landslide protection areas required by this chapter, or the limits of the proposed site disturbance outside of the landslide protection areas, using methods and materials acceptable to the county.
 - 6. Landslide protection area boundaries shall be permanently marked on the site prior to final inspection by the county using methods and materials acceptable to the county.
 - 7. Vegetation clearing requirements for development in landslide protection areas, steep slope hazard areas and landslide hazard areas.
 - a. Clearing or vegetation removal in landslide protection areas, steep slope hazard areas or landslide hazard areas or their buffers is prohibited except for:
 - (1) Activities included in an approved geologic hazard area study as defined in Section 40.430.030(C);
 - (2) Limited vegetation removal for surveying and testing necessary for development approvals;
 - (3) Emergency or fire hazard removal authorized by the fire marshal;
 - (4) Removal of nuisance vegetation using methods which minimize disruption of soil and non-nuisance vegetation;
 - (5) Clearing necessary for placement or maintenance of fencing;
 - (6) Clearing necessary for hillside vegetation restoration;
 - (7) Clearing necessary for vegetation or resource conservation projects authorized by a public agency; and
 - (8) Clearing for three (3) foot wide or narrower foot paths surfaced with wood, soil or gravel.
 - b. Proposals for clearing may also be subject to other critical areas regulations. Wildlife habitat near streams, which have clearing requirements under the habitat conservation regulations, often overlap with steep slopes included in geologic hazard areas.
- C. Submittal requirements.
 - 1. For development activity regulated by this chapter, submittal requirements will vary depending on the type of project and the type of hazard mitigations that are proposed. Pursuant to Section 40.500.010, a review of a geologic hazard area will be conducted in conjunction with the primary development application. Projects are required to submit a basic site description sufficient to verify that the location of proposed building and access road improvements comply with buffers,

setbacks, and vegetation preservation required by Sections 40.430.020(D) and (E). If a regulated activity is proposed within a geologic hazard area, additional information in the form of a geologic hazard area study must be provided to assure the project is feasible and will not cause an increased geologic hazard. The information required for a site description is included in subsection (C)(3) of this section. The requirements for a geologic hazard area study for projects wishing to build in a geologic hazard area are included in subsection (C)(4) of this section. To avoid duplication, the information required by this section shall be coordinated by the county with the assessments and requirements for other associated permits.

2. The responsible official shall waive parts of the submittal requirements if it is determined that they are not applicable to the proposed activity.
3. Site Description. As part of the development permit application, the following information describing the subject property and areas within twenty-five (25) feet of the property lines or smaller area of concern as deemed appropriate by the responsible official, drawn to an engineering scale no larger than one inch equals twenty feet (1" = 20') and no smaller than one inch equals one hundred feet (1" = 100') as deemed appropriate by the responsible official:
 - a. The site boundary lines;
 - b. The topography at contour interval of no greater than five (5) feet;
 - c. The location and size of all existing and proposed site improvements including structures, wells, drainfields, drainfield reserve areas, public and private right-of-way easements, and utilities;
 - d. The location of all drainage-flow characteristics, streams, groundwater seeps, springs, and evidence of seasonal surface water runoff or groundwater;
 - e. The location and extent of all existing and proposed grading activities and existing natural or artificial drainage control facilities and systems;
 - f. The location and description of all geologic hazards located on the site and observed on properties within one hundred (100) feet of site boundaries;
 - g. The general location of all vegetation and the general location, number and description of all trees over six- (6) inch diameter measured three (3) feet above the ground; and
 - h. The location of all proposed buffers and setbacks.
4. Geologic Hazard Area Study. A geologic hazard area study is required if the proposed development does not comply with requirements of Sections 40.430.020(D), steep slope hazard areas, or Section 40.430.020(E), landslide hazard areas. Geologic investigation may also be required in some cases to meet Uniform Building Code requirements for foundations and for seismic design. Geologic hazard area studies shall be prepared, stamped and signed by a geotechnical engineer or geologist who meets the requirements defined in Section 40.100.070. Based on the site characteristics and the information submitted by the applicant, the responsible official may require all or part of the following information to be included in a geotechnical report:
 - a. The requirements for the site description listed above in subsection (C)(3) of this section;
 - b. Site geology information:
 - (1) Topographic contours at two- (2) foot intervals or as specified by the responsible official;
 - (2) Subsurface data that includes the exploration method, location of soil borings, borings, logs, soil and rock stratigraphy and groundwater levels including seasonal changes;
 - (3) The location of landslides, or down-slope soil movement, faults, and geologic contacts on the subject property and adjacent properties;
 - (4) A site history that describes any prior grading, soil instability or slope failure; and
 - (5) A description of the site vulnerability to seismic events.
 - c. Geotechnical information and plan requirements:
 - (1) A slope stability study and opinion of slope stability on the subject property and adjacent properties;
 - (2) Grading plan;
 - (3) Structural foundation requirements and estimated foundation settlements;
 - (4) Soil compaction criteria;
 - (5) Allowable soil-bearing pressure for foundations, minimum footing widths, piling recommendations for foundations, and design pressure for retaining walls;
 - (6) Laboratory data and soil index properties for soil samples;
 - (7) Suitability for fill;

- (8) Lateral earth pressures;
 - (9) Description of erosion vulnerability and an erosion control plan as required in Chapter 40.380;
 - (10) An evaluation of proposed surface and subsurface drainage in a stormwater control plan as required in Chapter 40.380;
 - (11) Building limitations; and
 - (12) A vegetation management and restoration plan or other means for maintaining long-term stability of slopes.
- d. A site evaluation that describes the suitability of the site to accommodate the proposed activity;
 - e. Such additional information describing existing physical features for the site and surrounding area as required by the responsible official to complete review of the project under standards of the Uniform Building Code.